JCI 147 Faraday Pail

For sensitive measurement of electrostatic charge on components and small quantities of materials

The JCI 147 Faraday Pail is a sensitive instrument for precise and reliable measurement of nett electrostatic charge. The sensitivity allows charges to be measured with a resolution down to 1pC.

The unit comprises a Faraday Pail mounted on high quality insulation in a well defined mechanical arrangement relative to the sensing aperture of a JCI 140 Static Monitor. Charge placed in the pail raises the voltage of the pail a little, in relation to the capacitance of the pail. This increase in voltage is measured by the JCI 140. The pail is relatively deep (a height to diameter ratio of 1.5) so all charge introduced into the pail couples to the pail so long as the pail is not filled too full - not above about 40%. The charge appearing on the outside of the pail is equal to the nett quantity of charge placed into the pail. It is not necessary that the charge introduced conducts to the pail, so measurements are equally applicable to insulating materials and conducting components placed into the pail. The shielding around the pail ensures that measurements are no affected by nearby static charges on people or surfaces.

The attraction of a Faraday Pail based on the use of a 'field mill' type fieldmeter is the near zero charge leakage (limited only by insulation leakage, 10^{14} ohms or more) and the high sensitivity. If there is any doubt about the quality of the electrical insulation this may easily be tested by first temporarily earthing the pail and then observing the stability of the zero charge reading on the JCI 140. With some charge placed in the pail the lack of leakage is observing by noting how slowly the reading decreases.

The JCI 140 Static Monitor is easily removable from the mechanical arrangement and can be used in its own right for other measurement purposes.

Why bother about static?

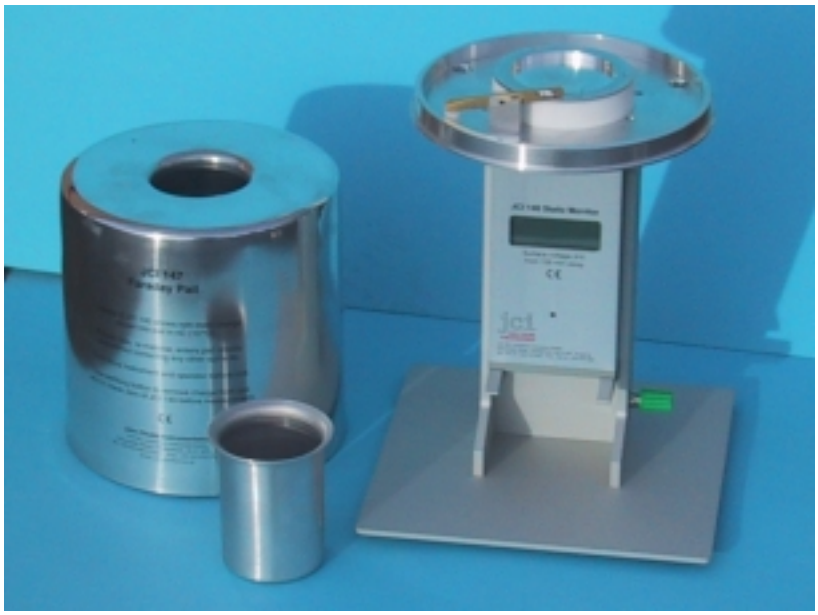
Many materials, in particular plastics, easily become electrostatically charged when rubbed against other materials. Such 'triboelectric' charging causes problems in many areas of industry. It can cause ignition of flammable gases and give shocks to personnel. It can make thin films and light fabrics cling, attract airborne dust and debris, damage semiconductor devices and upset the operation of microelectronic equipment.

The risks and problems arising from static electricity are best avoided by ensuring that static charge can dissipate over and through the surfaces of materials and away to earth more quickly than charge is generated. For normal manual handling and body motion activities this means the charge decay is preferably below ¼ second.

jci
John Chubb
Instrumentation

JCI 147 SPECIFICATION

Sensitivity:	• 2,000 and 20,000 pico-Coulombs full scale 1pC resolution • Sensitivity selected via on/off switch or by external control signal
Zero stability:	• Noise within ±1pC. Zero stable ±10 pC.
Accuracy and linearity:	• Within ±5%FSD on display and analogue output
Response:	• -3dB at 35Hz. (–3dB at 70Hz for JCI 140 F)
Display:	• 3½ digit liquid crystal display of charge directly in pico-Coulombs with polarity and `LO BATT' indication
Audio alarm:	• Pulsing audio signal when above user set level
Controls:	• On/off slide switch: off - range 1 - range 2 • Screwdriver set alarm threshold • Screwdriver zero setting adjustment
JCI 140 Power supply:	• Replaceable PP3 battery via 8w mini DIN from external floating 12V supply •2.1mm d.c. power connector for 12v 'Wall Cube' external floating power supply input
External connections:	• via 8w mini DIN connector: - analogue output signal (±2V FSD) - sensitivity range indication and sensitivity external control - earth - external power supply inputs • 2.1mm d.c. power input
Earth bonding:	• earth connection terminal on side of mounting frame
Dimensions:	• 180x180 baseplate 335mm high • 50mm dia pail, 75mm high. 50mm aperture in shield • Weight: about 3 kg
Option F:	• provides fast response (3ms) to enable rapidly changing events to be observed



Faraday pail, shield and support

HELP LINE

JCI offers consultancy through which we advise and assist customers who need to assess and overcome problems with static electricity. We also test customer materials for static charge dissipation and capacitance loading performance.

The business of JCI is the design, development, manufacture and marketing of high quality instruments for electrostatic measurements. JCI also carries out electrostatic testing of materials, consultancy and calibration of JCI instruments to BS 7506: Part 2: 1996.

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